

WHAT IS CLAIMED IS:

1. A manufacturing method of a semiconductor device comprising the steps of:

5 (a) forming an element isolation insulating film in a main surface of a semiconductor substrate;

(b) forming a gate insulating film on said main surface of said semiconductor substrate in an element forming region defined by said element isolation insulating film;

(c) forming a semiconductor film on said element isolation insulating film and on said gate insulating film;

10 (d) forming a resistance element on said element isolation insulating film and forming a gate electrode on said gate insulating film by patterning said semiconductor film;

(e) forming a mask material so as to cover said resistance element;

15 (f) forming a first source-drain region in said main surface of said semiconductor substrate in said element forming region by ion-implanting first impurities of a first conductivity type with said mask material as an implantation mask;

(g) forming a sidewall spacer on a side surface of said resistance element, said step (g) being executed after said step (f);

20 (h) by ion-implanting second impurities of said first conductivity type, implanting said second impurities into said resistance element and forming a second source-drain region in said main surface of said semiconductor substrate in said element forming region, said step (h) being executed after said step (g); and

(i) performing a thermal treatment to activate said second impurities.

25 2. The manufacturing method of a semiconductor device according to claim 1,

further comprising a step of

(j) forming a pocket region in said main surface of said semiconductor substrate at a region under an end of said gate electrode by ion-implanting third impurities of a second conductivity type with said mask material as an implantation mask.

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3. The manufacturing method of a semiconductor device according to claim 1, further comprising a step of

(k) forming a nitride film on an upper surface of said resistance element, said step (k) being executed before said step (i).

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4. The manufacturing method of a semiconductor device according to claim 1, further comprising a step of

(l) forming a nitride film on a side surface of said resistance element, said step (l) being executed before said step (i).

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5. The manufacturing method of a semiconductor device according to claim 1, further comprising a step of

(m) nitriding an upper surface of said element isolation insulating film, said step (m) being executed before said step (c).

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6. The manufacturing method of a semiconductor device according to claim 1, further comprising a step of

(n) forming a silicon-germanium film on said element isolation insulating film and on said gate insulating film,

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wherein said semiconductor film is formed on said silicon-germanium film in

said step (c).

7. The manufacturing method of a semiconductor device according to claim 1, further comprising a step of

5 (o) forming a silicon-germanium film on said semiconductor film.

8. The manufacturing method of a semiconductor device according to claim 1, wherein said semiconductor film contains silicon,

and said manufacturing method further comprises a step of

10 (p) ion-implanting germanium into a side surface of said semiconductor film.

9. The manufacturing method of a semiconductor device according to claim 1, wherein said resistance element is a single-crystal silicon film.

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10. The manufacturing method of a semiconductor device according to claim 9, wherein said semiconductor film is an amorphous silicon film,

and said manufacturing method further comprises a step of

20 (q) irradiating a laser beam onto a portion of said amorphous silicon film corresponding to said resistance element, said step (q) being executed before said step (d).

11. The manufacturing method of a semiconductor device according to claim 1, wherein said semiconductor film is an amorphous silicon film,

and said manufacturing method further comprises a step of

25 (r) changing said amorphous silicon film into a polysilicon film by performing a

thermal treatment at a low temperature for a long time, said step (r) being executed before said step (d).